



NEW ROTORCRAFT

Flying the boundary layer

by Mark Huber

In Louisville at last year's Heli-Expo, the world's largest helicopter trade show, it snowed. Many demonstration flights were canceled. From the dais at the annual awards dinner, industry gentry led the assembled in song, *My Old Kentucky Home*, a melancholic state ballad that can evoke weeping amongst the citizenry. Somehow it all seemed appropriate. Despite the brave public face the industry tried to project to the world last year,

it was one of the worst in memory for the commercial helicopter business, fueled mainly by oil prices that sunk to a low of \$26 per barrel before beginning a slow climb back to rationality, a domestic air ambulance industry that appears to have reached capacity and the continuing economic uncertainty worldwide.

The perfect storm in many ways has been unprecedented. Bell CEO Mitch Snyder stunned an

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audience of local Fort Worth business leaders in December when he told them that the worldwide market for commercial helicopters has shrunk by 50 percent since 2013. Bell shelved plans to build the new 505 light single at a purpose-built green-field plant in Lafayette, La., [moving production to its commercial plant in Mirabel, Quebec](#)—where there is plenty of excess capacity—as part of sweeping economic moves that put hundreds out of work. Bell suffered a more serious blow when the first prototype of the 525 super-medium twin [broke up in flight](#) in July. Flight-testing for that program remains on hold.

At the beginning of last year, Honeywell adjusted its turbine helicopter delivery forecast downward yet again, dinging it another 10 percent, mainly to acknowledge continuing softness in the oil-and-gas market. Safran's helicopter engine deliveries were down 15 percent in 2015 compared to 2014 and the 2016 numbers promise to be worse. Last year the company delayed or shelved several programs in response to market conditions. On the heels of posting a 17-percent decline in earnings this fall, Airbus Helicopters has announced a plan to trim its workforce by 582. For the third quarter, revenue was off 3 percent while earnings slid \$219 million from the year-ago period.

The revenue slide was fueled by waning demand for super-medium and heavy helicopters, as well as an overall drop in commercial hours flown. Airbus Helicopters has also been hurt by the worldwide grounding of the H225 Super Puma series in June following a fatal April 29 North Sea crash. While the [EASA lifted the grounding](#) in October, it remains in force in the UK and Norway. In addition to trimming its workforce, Airbus said it is continuing “transformation measures and efforts to adapt to market challenges.” One of those adaptations could be a delay in the company's marquis 13,000-pound-class H160 medium-twin program. Projected deliveries of that aircraft have slipped to 2019 from 2018, with a third prototype scheduled to join the program early this year.

OEMs Feel the Bite Globally

Reflecting the continued softness in both the military and civil helicopter sectors, Leonardo said that new AgustaWestland helicopter orders fell to €580 million (just over \$611 million) for the fall quarter from €624 million (nearly \$658 million) from the year-ago period and dropped to €1.538 billion (\$1.6 billion) for the first nine months of 2016 from €2.881 billion (\$3 billion) from the year-ago period. The helicopter order backlog also dropped, down to €9.669 billion (\$10 billion) for the first nine months of last year, from €11.7 billion (\$12.3 billion) from the year-ago period. The helicopter earnings margins have also declined, slipping to 9.7 percent for the quarter and 11.1 percent for the year. The much-heralded and long-delayed AW609 civil tiltrotor program was further delayed after the second prototype aircraft crashed in late 2015 in Italy and Italian prosecutors temporarily impounded the third flight-test aircraft last summer as part of the crash investigation.

Russian Helicopters is also feeling the bite, with new civil programs such as the Ka-62 experiencing significant delays. The company reported plummeting income for the first six months of last year, down 24.1 percent from the year-ago period to \$156 million.

As bad as things are at the OEMs, some operators have had it even worse. Bankrupt helicopter OGP services company CHC announced a [financial restructuring plan](#) on October 11 that will recapitalize the enterprise with \$300 million in new capital and leasing lines of \$150 million. GE Capital's Milestone Aviation Group and its affiliates are taking the lead on the latter. CHC filed Chapter 11 bankruptcy in the Northern District of Texas on May 5 and subsequently announced plans to shed most of its leased helicopter fleet, reducing its overall fleet size to 75 from 230. At the time of the bankruptcy filing, the company listed debts of \$2.19 billion against assets of \$2.17 billion as of January 31 last year.

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Erickson filed [Chapter 11 bankruptcy](#) November 8 in the U.S. Bankruptcy Court Northern District of Dallas, listing \$561 million in debt. The move comes after Portland, Ore.-based Erickson missed scheduled November 1 debt interest payments and days after the resignation of former chairman Quinn Morgan from Erickson's board. Companies controlled by Morgan bought Erickson in 2007, took it public in 2012 and engineered its 2013 acquisition of Evergreen Helicopters and Air Amazonia, which burdened Erickson with \$355 million in debt at the same time the global oil-and-gas market was collapsing. Erickson subsequently lost major defense support and a critical fire-suppression contract from the U.S. Forest Service, leading it to post large quarterly losses over the last several years. The company is currently operating with \$60 million in debtor-in-possession financing from lien holders as it navigates court-supervised reorganization from which it plans to emerge later this year. Erickson employs 700 people worldwide and operates a diverse rotorcraft fleet that includes the S-64 AirCrane, for which it holds the type certificate.

As early as last March, OGP operator Bristow Group hinted for the first time that it might be forced to cancel orders or at least defer some new helicopter deliveries and will turn back some leased helicopters. Through the end of the year, the company continued to post large quarterly losses, and oil-and-gas revenue is down 25 percent from comparable periods in 2015, although company executives believe the market has now bumped bottom.

Not so apparently for the helicopter air ambulance industry in the United States, which faces a two-pronged assault from over-saturation and downward reimbursement pressure from public and private medical insurers. Air Methods, the nation's largest HEMS provider, notes that it collected on only 74 percent of private insurance claims in the first quarter of last year. For the first time since records have been kept, the size of the operational domestic helicopter EMS fleet

contracted, and Air Methods noted in a public filing with the U.S. Security and Exchange Commission that it was mulling deferral of some new aircraft deliveries on a 10-year order for 200 new Bell 407GXPs. "During 2016 we began discussions with Bell Helicopter Textron to modify the terms of the purchase agreement, including the total number of aircraft to be delivered under the agreement and application of related deposits," the company noted while later reaffirming its commitment to the model.

Against this backdrop, a case for pessimism would be easy, even logical. Yet there is no shortage of new helicopter programs, while a few albeit on stretched timetables, driven by the omnipresent needs for speed, range and economy from new technology. Even in this market, helicopter leasing companies are still regularly announcing deals: Milestone is expanding into helicopter EMS, LCI is already fully entrenched there and Waypoint continues to do OGP deals.

Among OEMs the consensus appears to be that the market might be getting ready to climb and new products need to be readied for the pipeline when it does. But for now, OEMs are flying an uncomfortable boundary layer: Facing the twin challenges of declining revenue in a down market and an immediate need to continue development funding to remain competitive in the future.

Piston Singles

Robinson R44 Cadet

Robinson delivered the first R44 Cadets last year. The two-seat Cadet provides greater performance margins than the standard four-seat R44, a 2,400-hour TBO and a (2016) base price of \$339,000 or \$367,000 with floats. Robinson developed the Cadet specifically for the training market. It retains the same basic airframe, rotor system and Lycoming O-540-F1B5 as the R44 Raven I; however, the rear seats are gone and the aft compartment has been reconfigured for cargo. Maximum takeoff weight is 2,200 pounds, 200 pounds short



Cicare Model 12

of the Raven I's. The engine is de-rated to produce 210 hp for takeoff and 185 hp continuous (down from 225/205 hp in the Raven I). The derating provides greater margins at higher altitudes. A newly designed muffler lowers the Cadet's flyover noise by 3 decibels. The Cadet will be available with optional air conditioning, autopilot and avionics packages tailored to VFR or IFR training.

In 2016 the Garmin G500H system became a new option for all R44s, including the Cadet. Previously available only on the R66 turbine single, the G500H is a combination primary and multifunction display, which provides flight instrumentation and moving map navigation on dual screens. The G500H screens are centered in a newly designed instrument panel that also provides traditional instruments. A Garmin GTN 650 or 750 touchscreen navigator is required with the G500H and sits just below the displays within easy reach of either pilot.

Enstrom TH180

Enstrom Helicopter resumed flight-testing the

two-seat TH180 in May last year, three months after the first test aircraft was destroyed in a hard off-airport landing. The pilot walked away with only minor injuries. Enstrom plans to add a third flight-test vehicle, which will be fully conforming, to the program and earn certification later this year.

The company announced the TH180 in 2014 and plans to certify the helicopter on the basis of the type certificate and rotor system of the larger three-seat 280FX to speed development. The TH180 is powered by a 210-hp Lycoming HIO-390 and has an engine governor and electric clutch switch; it has a useful load of 700 pounds, a maximum takeoff weight of around 2,250 pounds and a standard fuel capacity of 40 gallons. Target price is less than \$400,000. Company officials said the TH180 should post direct operating costs of around \$175 per hour and burn less than 12 gallons per hour. Enstrom's modernized production plant in Menominee, Mich. has the capacity to build 100 TH180s per year.

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Cicare Model 12

Argentine kit helicopter maker Cicare plans to enter the certified market with a variant of the Model 12 two-seater within “three to four years.” The Model 12 kit sells for \$189,000. It is powered by a 180-hp Lycoming HIO-360G1A four-cylinder piston engine; empty weight is 948 lbs and mtow is 1,543 pounds; cruise speed is 89 knots, with a Vne of 110 knots. The Model 12 has a two-blade composite main rotor system lifed on condition, monocoque cabin construction and tube skid gear. In the cabin are a T-bar cyclic, bullet-shaped instrument cluster and toggle switches. It is stylistically similar to the smaller 992-pound-mtow, 130-hp, 80-knot Model 8, which has been certified under ULM rules in Europe and Argentina.

Turbine Singles

Bell 505 Jet Ranger X

Bell Helicopter announced on December 21 that it had received type certificate approval from Transport Canada for the five-seat Model 505 Jet Ranger X light single. FAA and EASA approvals and first deliveries are expected early this year. Bell unveiled the 505 in 2013.

The helicopter is powered by a 504-shp Safran Arrius 2R turboshaft with dual-channel Fadec (3,000-hour TBO) and has the Garmin G1000H avionics suite. In March, Safran provided details about plans to offer 505 customers support-by-the-hour maintenance coverage in cooperation with Bell’s Customer Advantage Plan, with no

Kaman K-Max (K-1200)



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minimum annual flight-hour requirement, for \$300 per flight hour. Development costs and time on the 505 were reduced by using much of the main rotor system of the 206L4 LongRanger. The 505 has a maximum cruise speed of 125 ktas, a maximum range of 340 nm, a useful load of 1,470 pounds, a wide-opening double door, and an open layout with flat cabin floor and 61 cu ft of rear cabin volume for passengers or cargo. Initial price of the base aircraft will be “around \$1 million.”

Bell currently holds letters of intent for north of 400 Jet Ranger Xs and is in the process of converting them to firm orders. Bell CEO Mitch Snyder said he anticipates Bell will deliver fifty 505s this year, ramping up to an annual production rate of 150 next year. The company plans to offer kits for the 505 to perform executive, utility and law-enforcement missions, and it says some of the configurations are well along in certification testing.

Mecaer Aviation Group is developing lavish interiors for private aircraft that it says will feature

multiple storage consoles and “trim options” to create “an added level of comfort and technology that is unique for each customer.” Early last year, United Rotorcraft unveiled an EMS interior for the 505. The simple quick-change design weighs less than 60 pounds and uses existing aircraft hard points.

Leonardo AW009

Leonardo’s AW009 light single, the rebranded SW-4, was originally developed by Polish airframer PZL-Swidnik in 1981. The design first flew in 1996 and has undergone several refinements since Leonardo acquired a majority stake in the company in 2009. Among the recent improvements are Genesys avionics, a better hydraulic system and a mass vibration absorber for a smoother ride. The standard 113-knot 009 is powered by the Rolls-Royce 250-C20R/2 and has an mtow of 3,968 pounds. AAL USA in Huntsville, Ala., has been subcontracted to complete the avionics and integration of the powerful Rolls-Royce



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-C30P engine into the helicopter. FAA certification is expected later this year.

While a firm price for the helicopter has not been announced, Leonardo executives said it will be between \$1.2 million and \$1.5 million. The aircraft will be built in Poland and shipped to the U.S. for completion and delivery at AAL Huntsville.

Innova/Composite Helicopters C630

U.S.-based Innova Aerospace is looking to fly a fully conforming prototype of the Composite Helicopters C630 five-place light single powered by a production Rolls-Royce RR300 turboshaft later this year. The helicopter will be one of two used in a parallel certification program with the New Zealand CAA and the U.S. FAA with the target of achieving full approval in 2018. Innova reported recent progress with the program, citing the completion of all production molds, the initiation of parts manufacture and “final review” of the production gearbox. Privately held Innova said it has access to enough money to see the program through certification and initial production in New Zealand. Innova has not set a price for the helicopter and is not taking orders yet.

Innova acquired the intellectual property rights to the New Zealand-based program in 2015. Preliminary specifications for the carbon-fiber rotorcraft: cruise speed of 125 knots, range of 450 nm (no reserve) and 1,350 pounds of payload. Composite Helicopters debuted the initial design, the KC518, at AirVenture Oshkosh in 2011 with plans to market it initially as a kit before pursuing certified production. Two prototype aircraft crashed in 2013 and 2014. In 2015 those initial development plans changed, with the company announcing that it intended to eschew kit production in favor of three different certified models: the KC630 with a Rolls-Royce 300 in an executive five-seat configuration; the KC650 powered by a Honeywell LTS101 in a utility six-seat configuration; and an intermediate KC640 with a Rolls-Royce 250-C20B.

The company had anticipated certification for the KC630 late this year, followed by the KC650 and KC640 in 2018. Innova has renamed the KC630 simply the C630 and it is the only design the company is currently pursuing. Composite Helicopters claims its rotorcraft is the first with a full monocoque fuselage fabricated entirely from rigid composite materials.

Marengo Swisshelicopter SKYe SH09

Marengo unveiled the \$3.5 million SKYe SH09 single-turbine utility helicopter in 2009, but the program has been beset by delays and schedule slippages. The first prototype did not take flight until 2014. Flight-testing was halted while the main rotor head and rotor blades were redesigned and fitted to the second prototype, which then took flight in February last year. Meanwhile, the certification timetable has slipped to 2018 from 2016. A third prototype is currently under construction and is expected to fly this year. Marengo has 150 employees and said it holds letters of intent for 90 helicopters.

In December, company founder and CEO Martin Stucki mutually agreed with the company's board to “retire” immediately and was replaced at the Swiss startup helicopter manufacturer by former Airbus Helicopters senior executive Andreas Loewenstein. Marengo is now largely funded by Russian billionaire Alexander Mamut. His interests on the board are represented by Marina Gronberg.

The SH09 features all-composite construction, a flat-floor cabin and rear clamshell doors. It is a large single designed to carry one pilot and up to seven passengers. Power comes from a Honeywell HTS900-2 turbine with Fadec. The SH09 also will be equipped with Honeywell Hums, enabling operators to monitor mechanical rotating components and subsystems on their helicopters continuously and become aware of potential problems before they occur.

The helicopter has a five-blade bearingless main rotor system and a shrouded tail rotor.

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Performance targets: 5,842-pound mtow, 140-knot cruise speed and 430 nm range. In August last year the company broke ground on a 43,000-sq-ft (4,000-sq-m) assembly hall at Mollis airfield in the Swiss canton of Glarus. Scheduled for completion by the end of this year, the facility is expected to produce 10 helicopters in its first year of operation.

Avicopter AC311A

China's CAAC certified the two-ton AC311A "Air Wizard" single in August. The six-seater bears a striking resemblance to the Airbus H125/130 minus the shrouded tail rotor. It is a joint project of state-owned Avicopter and the Changhe Aircraft Industry Group. Avicopter says the utility single is designed to excel in high-altitude operations. Power comes from a Safran Arriel 2B1A.

Kaman K-Max (K-1200)

Kaman has resumed production of the single-seat, single-engine K-Max utility external-lift helicopter. Powered by a single Honeywell T53-17 (flat-rated to 1,500 shp) and characterized by its intermeshing, contra-rotating dual main rotors, the K-Max found favor with commercial operators, notably in the logging industry in no small part because it can lift more than its own empty weight (6,000 pounds versus 5,145 pounds). The company had built 38 before shutting the line in 2003. Two unmanned K-Maxes were operated in Afghanistan on an extended trial by the U.S. Marine Corps and Lockheed Martin. That demonstration helped to rekindle interest in the helicopter and two years ago Kaman announced that it would restart production. The first aircraft from the re-opened line is scheduled to be delivered this year.

Twins

Leonardo AW109 Trekker

Leonardo's AW Trekker light twin logged its first flight on March 2 last year at the

company's helicopter division in Cascina Costa, Italy. Two prototypes will be used for the flight-test program, and EASA certification is expected this year. The Trekker is a skidded version of the AW109S Grand and features single-pilot IFR Genesys Aerosystems avionics and a pair of Fadec-equipped, 815-shp Pratt & Whitney Canada PW207C turbo-shafts that deliver a maximum speed of 168 knots. It has a maximum takeoff weight of 7,000 pounds and will have an endurance of four hours, 20 minutes or 445 nm with a modular, five-cell fuel system. Leonardo says it has written orders for "several dozen" Trekkers to date. The machine is aimed primarily at the EMS and utility markets.

Airbus H135 Helionix

Airbus Helicopters has received EASA type certificate approval in November for the Helionix cockpit in the H135 light twin. The four-axis autopilot will help EMS pilots concentrate on their environment, thanks to a "hover hold" function. Another new feature is flight envelope protection, such as preventing aircraft and engine overspeed. Finally, an electronics bay has been moved, freeing a few cubic feet in the aft cabin. The night vision goggle-compatible Helionix suite is already available on the larger H145 and H175 twins and has three large displays, the four-axis autopilot, first limit indicator, two touchscreen Garmin GTN 750 GPS navcoms and the Avidyne ADS-B-capable TAS620A traffic advisory system. The Avidyne system displays 30 targets and tracks 50 to a range of 21 nm, an ADS-B range of 40 nm and a vertical range of +/-10,000 feet. Deliveries of H135s equipped with Helionix will start this year, with HEMS provider Norsk Luftambulans and Ascent Flight Training as the launch customers. Ascent was appointed by the Ministry of Defence to provide the UK's Military Flying Training System.

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Avicopter AC312e

In July last year the Aviation Industry Corporation of China (Avic) began flight-testing the AC312e light-medium twin helicopter, a derivative of the previous “A” model, itself a descendant of the Harbin Z-9, which was based on the Airbus Helicopters AS365 and manufactured in China under license since the early 1980s and in service since the early 1990s. A substantially upgraded model powered by Arriel 2Cs was introduced in 2002. Avic has produced a couple of hundred Z-9s.

According to Avic, the 312e will offer better high/hot performance thanks to a pair of Safran Arriel 2Es (1,000 shp each) and Rockwell Collins Pro Line 21 avionics to support growth for synthetic vision, helicopter Taws and EFB. Optional are the RTA-4112 MultiScan weather radar and the TTR-4100 Tcas II traffic surveillance system. The 312e will be able to carry nine passengers, have a maximum cruise speed of 165 knots, a maximum takeoff weight of 9,921 pounds (4,500

kg) and a service ceiling of 19,685 feet. Certification is expected later this year.

Russian Helicopters Ka-62

Derived from the Ka-60 military prototype, the 14,800-pound (mtow) Ka-62 was revealed in 2012 and first flew in April last year. Announced launch customers for the \$10 million, 12- to 15-passenger twin are Atlas Taxi Aereo in Brazil and Vertical de Aviacion in Colombia. The helicopter is powered by a pair of Safran Ardiden 3Gs (1,680 shp each) but uses Russian Transas avionics.

Harbin Z-20

Basically a Chinese copy of the Sikorsky S-70 that first flew in 2013. The program remains in development.

Avicopter AC352

The AC352, powered by the Chinese-built WZ16, logged its first flight on December 20 in Harbin, China. It is the Chinese-built version of the super-medium Airbus Helicopters H175. Certification



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of the AC352 has been delayed while the new engine moves through development toward EASA certification, now expected by the end of this year, followed by CAAC approval next year, Safran said. The H175 was developed jointly by Airbus Helicopters and Avicopter, with the latter responsible for manufacturing the fuselage and certain subassemblies. The H175 is powered by a pair of Pratt & Whitney Canada PT6C-67Es and was certified in 2014.

The AC352 can be sold only in China and a small number of countries close to China where Airbus would be unlikely to sell any H175s. The WZ16 is the Chinese variant of the Safran Ardiden 3C. Safran says the new-generation 1,500- to 2,000-shp turboshaft features “compact modular architecture, a best-in-class power-to-weight ratio, low cost of ownership and 10 percent lower fuel consumption than competitive engines.” The new engine was a joint development and production project by Safran Helicopter Engines, CAPI and Dongan, parts of the new Aero Engine Corporation of China (AECC) consortium.

Airbus H160

Airbus Helicopters unveiled the all-composite H160 medium twin in 2015. Successor to the AS365/EC155, it is targeted at the market currently served by the Leonardo AW139. Airbus estimates the H160 will have a fuel-burn advantage of 15 to 20 percent over the AW139. The Safran Arrano engines are 10 to 15 percent more efficient than previous-generation engines and have a two-stage centrifugal compressor associated with variable inlet guide vanes for better specific fuel consumption in all phases of flight but particularly in cruise.

The H160's main gearbox is a clean-sheet design with a new approach to lubrication redundancy. Two independent systems run full-time. In the event the main lubrication system fails, the backup provides enough lubrication for about five hours. The backup system, which is entirely internal, has no cooling circuit. To address failure of

both systems, run-dry capability of greater than 30 minutes has already been demonstrated.

Two prototypes are currently in flight-test and a third is expected to join the program soon. Certification is expected next year. The H160 has Blue Edge main rotor blades for quieter operation, a canted Fenestron tail rotor for more payload and the house-developed Helionix avionics suite that can be found on other newer Airbus models. The Helionix flight deck is similar to that of the H175, using four six- by eight-inch displays. A major difference is the return of the overhead panel for engine controls. Cursor-control devices are a key pilot interface and for the mission display a touchscreen will be optional. Other innovations include a fully composite airframe, a biplane stabilizer—for improved main rotor efficiency—and electric landing gear.

For the offshore oil-and-gas mission, the H160 will offer class 1 takeoff performance for 12 passengers and a 120-nm radius of action. Other goals include hover out of ground effect at up to 5,000 feet and range of 450 nm with a 20-minute reserve. The “smooth cruise speed” will be 160 knots, without any counter-vibration system. A de-icing system is not planned yet, although the company has made provisions for it.

The H160 will pioneer a brand new assembly model at Airbus Helicopters that will enable manufacture in just 18 weeks. Each H160 will consist of five major component assemblies that are fully completed and tested before they reach the final assembly line.

Bell 525

Bell will certify the super-medium 525 Relentless using four test aircraft, and a senior company executive maintains the company retains confidence in the super-medium twin's original design. The program has stood down flying since the fatal crash of the first prototype, FTV1, registered as N525TA, on July 6 last year. The NTSB is continuing its investigation into why the main rotor blades struck both the tail boom and the nose during the in-flight break-up

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sequence, which destroyed the helicopter and killed both test pilots. FTV1 was one of three 525 prototypes in the flight-test program, which at the time was budgeted for five aircraft. FTV1 is believed to have been conducting tests at or near Vne when the main rotor rpm dropped off and the main rotors significantly “departed their normal plane of rotation,” according to an NTSB spokesman.

Bell continues to assemble the next two flight-test aircraft and begin construction of the first several customer aircraft. FTV4 is heavily kitted with search-and-rescue equipment and more flight-test instrumentation than originally planned. Bell expects it to be ready to fly early this year. FTV5 will have a lot of the oil and gas mission kits on it. Between those two aircraft, approximately 50 kits will be certified as part of the initial flight-test program. Aircraft six through nine were in structural subassembly late last year.

The 525 is a 20,500-pound super-medium with

capacity for up to 20 passengers in high-density configuration, a maximum range of 570 nm (no reserve), a maximum cruise speed of 162 knots and a ceiling of 20,000 feet. The 525 is powered by a pair of GE CT7-2F1s (1,800 shp each) driving an all-composite five-blade main rotor system and a four-blade tail rotor. The airframe is a hybrid of aluminum and composite materials. The aircraft incorporates a triple-redundant fly-by-wire flight control system with a BAE flight control computer and sidesticks in place of conventional cyclics linked to a four-screen Garmin G5000H touchscreen avionics suite with Telligence voice command. Bell has not published a price for the 525 nor has it updated the program schedule since the accident last year. It claims to hold letters of intent for 80 helicopters.

Russian Helicopters Mi-171A2

Russian Helicopters aims to have this upgraded version of the venerable Mi-8/17 certified later this year. The A2 introduces a two-man crew (down



Russian Helicopters Mi-38-2

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from three), a KBO-17 glass-panel avionics suite, a lighter main rotor system that delivers 1,500 pounds more lift, and a 2,200-pound increase in mtow. Power comes from a pair of Klimov VK-2500PS-03s (2,400 shp each for takeoff). The new engines provide 400 more shp than is available in the Mi-8/17, boost cruise and maximum speeds by 16 knots and extend range to 430 nm from 320.

Airbus Helicopters X6

The replacement for the H225 Super Puma remains in the concept stage. Entry into service is expected in the mid-2020s. Airbus has floated a few clues on the new helicopter. Expect full fly-by-wire digital flight controls, all-weather capability with full de-icing, the extensive use of composites and advanced manufacturing, and two engines. Airbus has also hinted that the X6 will share some commonality, most likely in the avionics, with the H160 and H175.

Russian Helicopters Mi-38-2

The long-delayed replacement for the Mi-8 has been redesigned once again, this time with all-Russian content. The heavy (34,400-pound) twin with seating for up to 30 will now be powered by a pair of Klimov TV7-117V turboshafts (2,800 shp each) and have a cockpit with a Russian-designed IKBO-38 glass avionics suite with five LCDs. Four prototypes have flown so far and Russian Helicopters hopes to have the type ready for customers late this year or early next.

Avicopter AHL

Last year China and Russia entered into a joint venture to develop the AHL (Advanced Heavy Lifter), a scaled-down version of the massive Russian Mi-26 Halo, the world's largest helicopter. Mtow is estimated at 88,000 pounds with seating for up to 60. First flight could come as early as next year. Performance targets are maximum speed of 162 knots, range of 391 nm and ceiling of 18,700 feet. The AHL will require two 8,000-shp engines driving a seven-blade main rotor system and a five-blade tail rotor.

Russian Helicopters Mi-26T2V

The latest upgraded version of Russia's monster ship has advanced navigation and handling systems and a new autopilot as part of the Breo-26 glass cockpit avionics suite, as well as advanced video capabilities to assist in monitoring external loads.

Compound Helicopters

Airbus LifeRCraft

LifeRCraft builds on Airbus's compound X³ research demonstrator, which debuted in 2010 and has since been retired. The X³ dashed at 255 knots in level flight in 2013. LifeRCraft is being built as part of the Clean Sky 2 European research program. First flight could happen in 2019 and the design could result in a commercial product by 2030.

Tiltrotors

Avic Blue Whale

Chinese state-owned aircraft company Avic is developing two variants of an "ultra fast" 270-knot tiltrotor code-named Blue Whale, English-language newspaper China Daily reported in December last year. Unlike tiltrotors such as the Bell Boeing V-22 Osprey or Leonardo AW609, the Blue Whale is a quad prop-rotor design. A medium variant is said to have an mtow of 44,090 pounds/20 metric tons and a heavy variant will have twice that capacity. Initial targeted range is 1,674 nm/3,100 km. Avic has not yet set a timetable for the program, with a company official saying only that he expects development to take "a long time."

Leonardo AW609

Flight-testing resumed in August last year following the fatal crash of the second prototype on Oct. 30, 2015. Despite the 10-month delay in the flight-test program, as well as calls for



wind-tunnel retesting and redesign of the fly-by-wire flight control system by Italian ANSV aviation investigators, the company insists that the AW609 remains on track for certification next year. The aircraft will be certified initially by the FAA under Parts 23, 25, 29 and a new category called powered lift. Two more prototypes are scheduled to join the test fleet, although neither had flown as of early last month.

Four interior configurations are being developed: a standard two-pilot, nine-passenger layout; a four-passenger luxury cabin; a six- and seven-passenger executive cabin; a two-litter medevac interior; a search-and-rescue design with hoist, basket, litter and four single seats; and a patrol/surveillance variant. A wider and flush-opening cabin door with a retractable hoist is being designed for later models. Pricing remains the subject of much speculation, but sources close to the program suggest it will be less than \$30 million in current dollars.

Announced performance: maximum forward speed of 275 knots, a ceiling of 25,000 feet, a hover out of ground effect of 5,000 feet, hover in ground effect of 10,000 feet and a useful load of 2,500 pounds. Short-takeoff capability will be added to the certification basis to raise the helicopter's maximum takeoff weight to 18,000 pounds from 16,800 pounds. The extra weight could be used to boost fuel capacity and range, now estimated at 700 nm but up to 1,100 nm with auxiliary fuel. The AW609 will be assembled in Europe and the U.S.

Leonardo AW CTR

Leonardo is developing a larger commercial tiltrotor expected to seat 25 to 50 passengers. It is partially funded by the European Union's Clean Sky 2 environmental initiative. If the program progresses, the machine could fly in 2020 and enter production in 2025. □